

1 **(April 30, 2001)**

2 ***Permanent Ground Anchor Materials and Components***

3 A permanent ground anchor system is a structural system used to transfer
4 tensile loads to soil or rock. A permanent ground anchor system may also be
5 specified in the Plans as an anchor, a ground anchor, or a tieback. A
6 permanent ground anchor system includes all prestressing steel, anchorage
7 devices, grout, coatings, sheathings and couplers if used.
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9 The Contractor shall either select a permanent ground anchor system from the
10 Qualified Products List or submit the following information to the Engineer for
11 approval:
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- 13 1. Catalogue cuts or Manufacturer's Certificates of Compliance for
14 anchorage covers, bond breaker, centralizers, corrosion inhibiting
15 grease, end caps, grout admixtures, and strand tendon spacers.
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- 17 2. Manufacturer's Certificates of Compliance for anchor heads, anchor
18 head wedges, bar tendon nuts, bar tendon couplers, tendon
19 encapsulation tubing, trumpet assemblies, and bar tendons or strand
20 tendons. The Manufacturer's Certificates of Compliance for the
21 anchorhead wedges (grippers), and bar tendon nuts and couplers,
22 shall confirm compliance with the specified strength requirements.
23

24 **Component Material Specifications**

25 Anchorage covers shall have a minimum thickness of five millimeters and
26 shall conform to either ASTM A 53 for pipe, or ASTM A 500 for tubing.
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28 Anchorheads shall conform to either ASTM A 36M, AASHTO M 169 Grades
29 1040 or 1045, or ASTM A 536 Grade 80-55-06.
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31 Bearing plates shall conform to either ASTM A 36M, ASTM A 572M, ASTM
32 A 588M, AASHTO M 270M, or ASTM A 536.
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34 Anchorhead wedges (grippers) shall conform to AASHTO M 169 Grade
35 12L14, case hardened 0.305 millimeters to 0.381 millimeters deep to
36 Rockwell C 59 to 65.
37

38 Bar tendon nuts shall conform to either ASTM A 29M Grade C1045, or
39 ASTM A 536 Grade 100-70-03, and shall be capable of developing 100
40 percent of the GUTS of the bar tendon.
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42 Bondbreaker shall conform to the requirements of Section 4.8 of the Post-
43 Tensioning Institute "Recommendations for Prestressed Rock and Soil
44 Anchors", Third Edition - 1996, and shall be fabricated from a smooth
45 plastic tube or pipe having the following properties:
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- 47 1. Resistant to chemical attack from aggressive environments, grout
48 or grease;
- 49 2. Resistant to aging by ultra-violet light;
- 50 3. Fabricated from material nondetrimental to the tendon;

4. Capable of withstanding abrasion, impact, and bending during handling and installation;
5. Enable the tendon to elongate during testing and stressing; and
6. Allow the tendon to remain unbonded after lock-off.

Centralizers shall be fabricated from plastic, steel, or material which is nondetrimental to the prestressing steel. Wood shall not be used.

Corrosion inhibiting grease shall conform to the requirements of Section 3.2.5 of the Post-Tensioning Institute, "Specification For Unbonded Single Strand Tendons".

Couplers for bar tendons, if required, shall be furnished by the manufacturer of the bar tendons and shall be AASHTO M 169 Grade 1144, or equivalent steel developing 100 percent of the GUTS of the bar tendon without evidence of any failure. Couplers shall be placed in the bond zone. Couplers for strand tendons will not be allowed.

End caps shall conform to ASTM D 3350 Class PE324420C, ASTM D 1248, and AASHTO M 252M.

Grout shall be a neat cement grout or a sand-cement grout. The compressive strength for the grout shall be as required by the tieback manufacturer and as approved by the Engineer. Grout components shall be as follows:

Admixtures shall conform to the requirements of Section 9-23.6. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations, trumpets and anchorage covers. Accelerators will not be permitted. Admixtures shall be compatible with prestressing steels and mixed in accordance with the manufacturer's recommendations.

Aggregates shall conform to the requirements of Section 9-03.

Cement shall conform to the requirements of Section 9-01, and shall not contain lumps or other indications of hydration.

Prestressing steel shall consist of either bar tendons with an ultimate tensile strength of 1,035 MPa conforming to AASHTO M 275M Type II, or strand tendons with an ultimate tensile strength of 1,860 MPa conforming to AASHTO M 203M. The Contractor shall submit certified mill test results and typical stress-strain curves along with samples from each heat, properly marked, for the prestressing steel to the Engineer. The typical stress-strain curve shall be obtained by approved standard practices. The guaranteed ultimate strength, yield strength, elongation, and composition shall be specified.

Strand tendon spacers shall be fabricated from plastic, steel, or material which is nondetrimental to the prestressing steel. Wood shall not be used.

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2 Tendon encapsulation, when specified in the Plans to provide additional
3 corrosion protection, shall be fabricated from one of the following:
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5 1. High density corrugated polyethylene (PE) tubing conforming to
6 the requirements of ASTM D 3350 Class PE335520C, ASTM D
7 1248, and AASHTO M 252M and having a nominal wall thickness
8 of 1,020 micrometers.
9
10 2. Corrugated, polyvinyl chloride (PVC) tubing conforming to ASTM D
11 1784, Class 13464-B, and having a nominal wall thickness of
12 1,020 micrometers.
13
14 Trumpet providing the transition from the bearing plate to the unbonded
15 length corrosion protection shall be fabricated from a steel pipe or tube
16 conforming to the requirements of ASTM A 53 for pipe or ASTM A 500 for
17 tubing. The trumpet shall have a minimum wall thickness of five
18 millimeters, and shall be seal welded to the bearing plate. The seal weld
19 shall be visually inspected only, in accordance with Section 6-03.3(25)A.